Transparency at Google

Hal Varian
Silicon Flatirons
Boulder
Feb 2019

Outline

- How does Google make money?
  - Search advertising
  - Display advertising
- Competition in search
  - Follow the money
- Competition in other services (chart)

- Hoovering up potential competitors
- R&D, venture funding
- Long tail keywords, scale
- Data portability

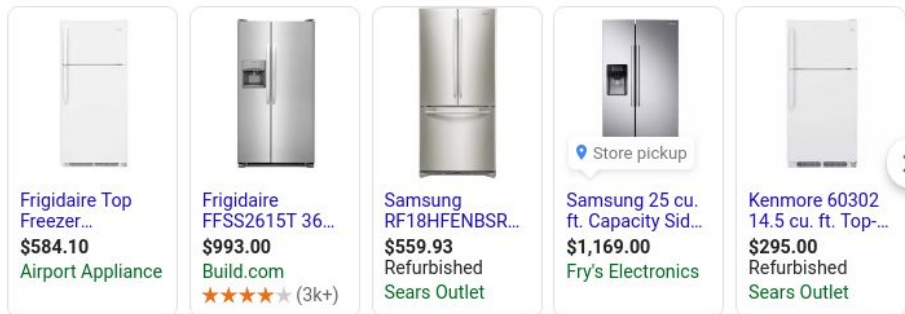# How does Google make money?

Search ads

- Most of Google's revenue comes from ads on Google Search
  - Advertiser chooses a keyword, user chooses a query, if they match, ad is eligible to be shown
  - Very effective since ad is highly relevant to query
  - Price is determined by an auction that uses bids and quality scores (pCTR, post click metrics)
  - Basically no personalization but advertiser can apply demographic filters
  - Detailed documentation, analytics tools available online
  - Revenue and cost documented on 10-k

Display ads

- Display ads appear primarily on 3rd party publisher sites
  - 70% of the ad revenue goes to publishers (TAC) which amounts to $12B per year (10-k)
  - Net revenue to Google is about $5B and this has to cover cost of serving
  - Targeting type is chosen by the advertiser, not Google
  - Targeting: contextual, publisher, reminder, interests based on website visits
  - Users can view their interests and edit them, delete them, opt out in Ads Settings or link from ad
  - Particularly important for general news since contextual ads don't work for most news stories
  - Behaviorally targeted ads are about 2-3 times as valuable as ordinary ads
  - So they provide more revenue to the content producer
  - See "Understanding emerging threats to online advertising"

Example of Google search results for [refrigerator]

Product listing ads

AdWords

Organic

Competition in search and other areas

Where's the competition in search? Follow the money.

- General purpose search is a tough business: you can only sell 6% of what you produce.
  - Why? Only [6% of clicks are commercial](#) clicks (ads)
  - Competition is intense for commercial clicks: Amazon, eBay, Yelp, Travelocity, Expedia, Orbitz, TripAdvisor, and thousands of other sites provide commercial search
- Nobody cares about competition in non-commercial clicks: book search, scholar search, patent search, encyclopedia search, etc.

Competition

Tech firms compete intensely against each other. That's why prices are low, and innovation is high.

Product	AMZN	AAPL	GOOG	FB	MSFT
advertising platforms	✓		✓	✓	✓
artificial intelligence	✓	✓	✓	✓	✓
browsers	✓	✓	✓		✓
cloud services	✓		✓		✓
digital assistants	✓	✓	✓	✓	✓
ebooks	✓	✓	✓		
email and messaging		✓	✓	✓	✓
games	✓	✓	✓	✓	✓
general purpose search engines			✓		✓
home delivery services	✓		✓		
maps		✓	✓		✓
office tools		✓	✓		✓
operating systems	✓	✓	✓		✓
smartphones	✓	✓	✓		✓
social networks			✓	✓	
special purpose search engines	✓	✓	✓	✓	✓
streaming video	✓		✓	✓	
video and music distribution	✓	✓	✓		
video conferencing		✓	✓	✓	✓

Acquisitions and R&D

Hoovering up competitors?

See [Wikipedia list of Alphabet acquisitions](#).

The median number of employees in a Google acquisition is less than 10..
Three-quarters of the acquisitions involved 20 or fewer people. The mode is 2.
The two outliers are HTC and Motorola.

Web search acquisitions: 3 acquisitions by Google in web search and they
occured in 2001, 2003 and 2006. There was a grand total of 4 employees hired.

WAZE has been mentioned as a potential competitor acquired by Google. Turns
out there are 21 producers of [satellite navigation software](#) so a single acquisition is
minor. Acquisition of WAZE was made to improve competitiveness in this
crowded field. (Note: most of these services are free.)

Innovation

Tech companies are leading spenders on R&D.

R&D (billions)

GAFAM	(red)
Auto	(green)
Pharma	(cyan)
Tech	(purple)

Companies (top to bottom): Amazon, Alphabet, Samsung, Volkswagen, Microsoft, Huawei, Intel, Apple, Roche, Johnson & Johnson, Merck, Daimler, Toyota, Novartis, Bosch, Ford, Facebook, Pfizer, GM, BMW, Honda, Oracle, Sanofi, Cisco, Celgen
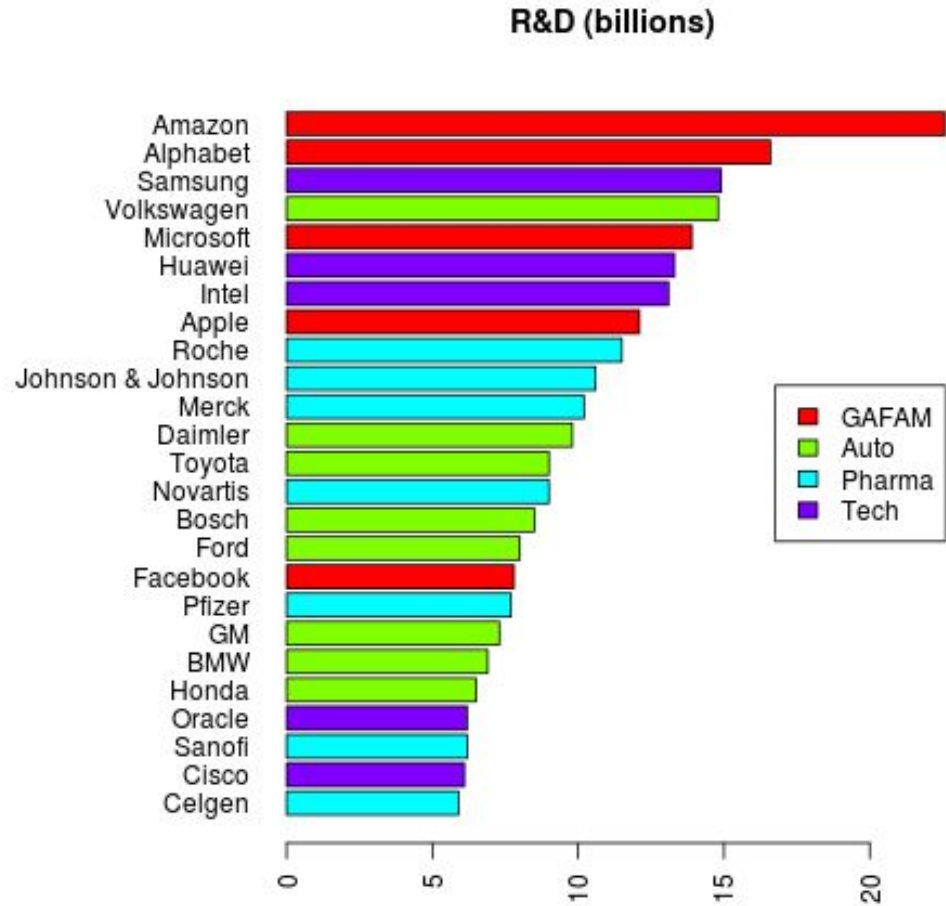
Source: Bloomberg

Entry: VC finance of US startups

Money Raised by Year: First Rounds vs. Later Rounds

Legend: Raised in Later Rounds ($M) — Raised in First Rounds ($M) — Number of First Rounds
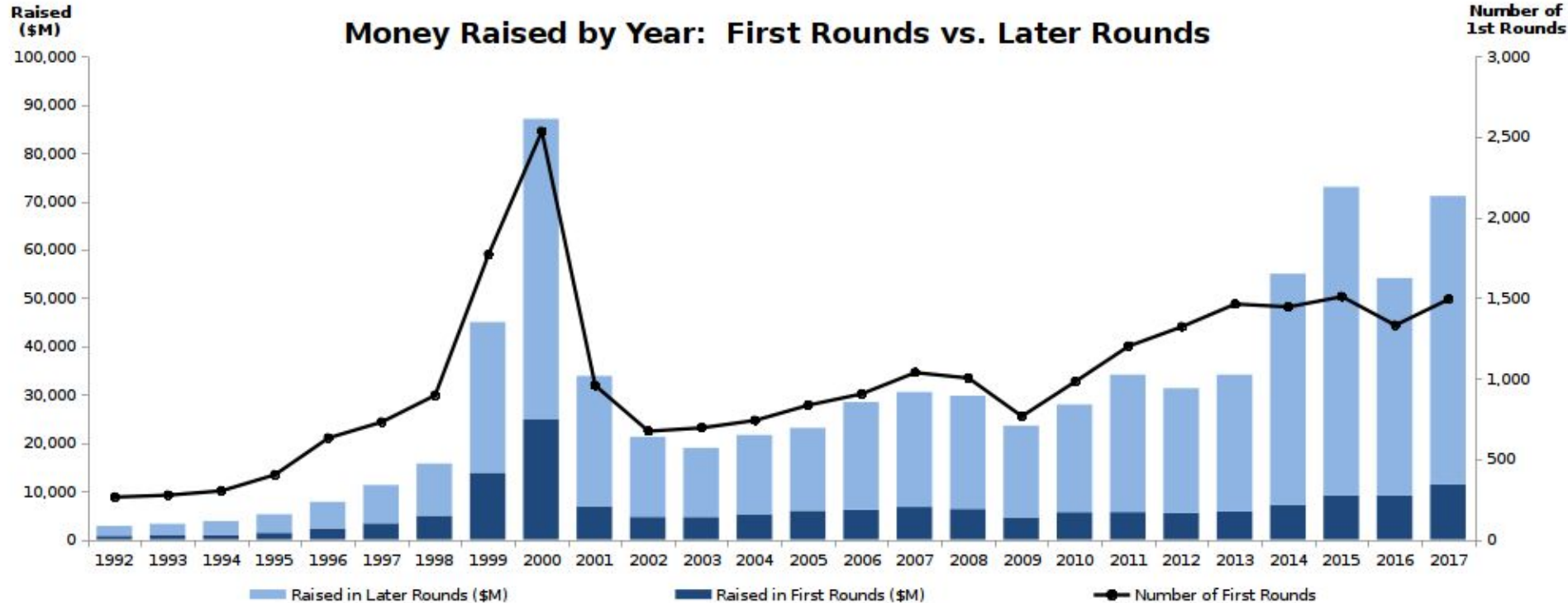
Source: Sand Hill Econometrics

How search works

Features user in search

From a search engine optimizer

Feature	Importance
Direct website visits	
Time on site	
Pages per session	
Bounce rate	
Total referring domains	
Total backlinks	
Total referring IPs	
Total follow-backlinks	
Content length	
Website security (HTTPS)	
Total anchors	
Keyword in anchor	
Keyword in body	
Keyword density	
Keyword in title	
Keyword in meta	
Video on page	

not important   very important
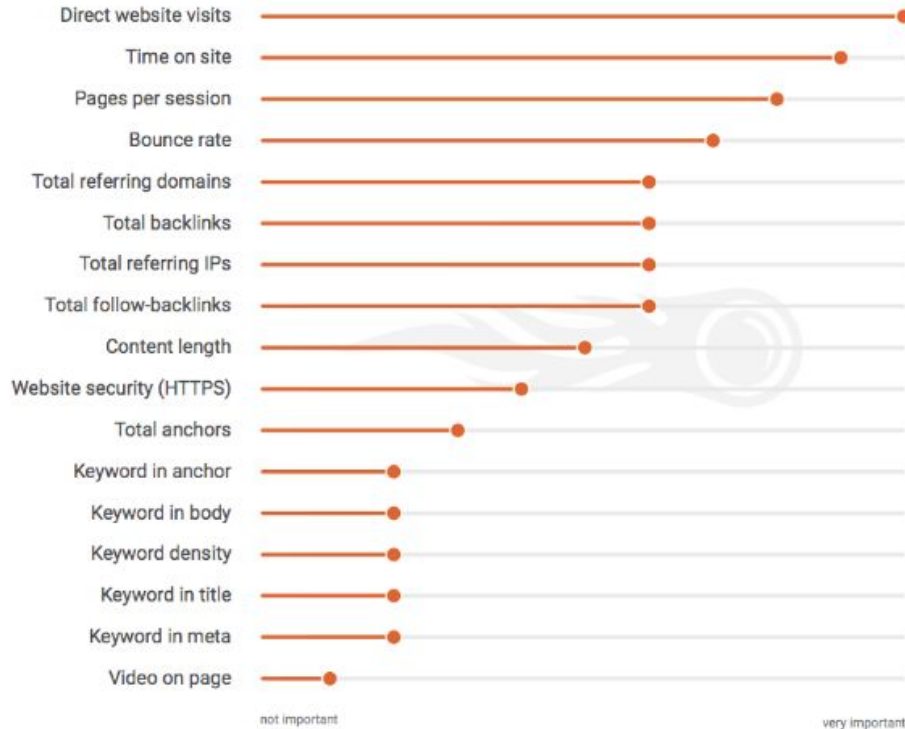
From Google

How search works

Google's Quality Raters Guidelines, 174 page document describing factors web raters should take into account. Web raters are paid of course.

Source: Search Engine Statistics

Open source and open data

Openness

Open source: Android operating system, Chrome browser, TensorFlow

Open data: imagenet, YouTube, Kaggle Kernels, dataset search, Trillion Word Corpus.

Data access by individuals: Takeout and Data Transfer project

- Human readable or machine readable?
- Privacy and portability
- Security issues

Google Takeout and Data Transfer Project

- Google+ +1s, Circles, Pages, Streams and posts
- Chrome Sync bookmarks
- Google Calendar appointments
- Google Contacts
- Google Drive files
- Google Fit
- Google Photos
- Google News
- Google Play Store
- Google Play Console
- Google Play Movies
- Google Play Music
- Google Play Games
- Google Play Books metadata and notes
- Google Groups
- Google Hangouts
- Google Hangouts On Air
- Google Keep
- Google Tasks
- Google Location History
- Gmail data

- Google Maps My Maps, saved places and reviews
- Google Profile
- Android Device Configuration Service
- Google Home App
- Input Tools
- Classic Sites
- Google Voice billing history, greetings and voicemail recordings
- Google Wallet
- YouTube videos, subscriptions, chats, own comments, playlists, history, live chat messages
- Google Pay
- Search Contributions
- Data Shared For Research
- Shopping Lists
- Textcube
- Google Home
- Bookmarks
- Hands Free
- Street View

The End

Long tail queries

It is claimed that "scale is important since larger search engine sees more rare queries and can recognize them when they reappear."

However, 38% of distinct queries have never been seen before, and most of them will never be seen again!

Counting long tail queries is pointless, you have to figure user intent from query

1. Many of the queries have geographic qualifiers
2. Many of the queries have spelling errors or typos
3. Many of the queries are long
4. Some of the queries will likely repeat
5. But many of the queries are likely to not be seen again for a long time

$35,000^3$, the total number of possible queriesis around 43 trillion. See Trillion Word Corpus.

Queries seen once in a given day...what is intent?

local weather leavenworth wa
cna/nurse registry in louisiana
dating sits in austin texas
a sentence with the word rival
custom make bench cushions
did alice walton get married
how to draw a coyote sitting
start wpf application with arguments from code
girls weekend away
reminder of payment due letter
carb calulator
creamy cilintro salad dressing
range of motion for the shoulders for men
www.icemakerfilter.com
2005 chevrolet equinox catalytic converter
warranty
adelita a mexican cinderella story lesson plans
dentists cedar rapids iowa
no period for 8 months an i still get pregnant

cool good games
2011 merrimack valley film fest
www.goodhousekeeiping.com/healthyhurry
horsepower sv1000
jordans for girls
free home remedies for urinary tract infections
best place to honeymoon in united states
coto fights
what is a soffit vent?
super suppers scottsdale
how do i write visual basic
example of annotated bibliography paper cornel
how much caffeine is toomuch
min outside wireless ptz drome camer
add music to power point 2007
wolf creek park coldspring tx
employee termination exhausting all leaves of absence
bbc tv arabec live

How to spell brittany spears … I mean britney spears

```
488941 britney spears      29 britent spears      9 brinttany spears     5 brney spears      3 britiy spears       2 brirreny spears
 40134 brittany spears      29 brittnany spears    9 britanay spears      5 broitney spears   3 britmeny spears     2 brirtany spears
 36315 brittney spears      29 britttany spears    9 britinany spears     5 brotny spears     3 britneeey spears    2 brirttany spears
 24342 britany spears       29 btiney spears       9 britn spears         5 bruteny spears    3 britnehy spears     2 brirttney spears
  7331 britny spears        26 birttney spears     9 britnew spears       5 btiyney spears    3 britnely spears     2 britain spears
  6633 briteny spears       26 breitney spears     9 britneyn spears      5 btrittney spears  3 britnesy spears     2 britane spears
  2696 britteny spears      26 brinity spears      9 britrney spears      5 gritney spears    3 britnetty spears    2 britaneny spears
  1807 briney spears        26 britenay spears     9 brtiny spears        5 spritney spears   3 britnex spears      2 britania spears
  1635 brittny spears       26 britneyt spears     9 brtittney spears     4 bittny spears     3 britnity spears     2 britann spears
  1479 brintey spears       26 brittan spears      9 brtny spears         4 bnritney spears   3 britntey spears     2 britanna spears
  1479 britanny spears      26 brittne spears      9 brytny spears        4 brandy spears     3 britnyey spears     2 britannie spears
  1338 britiny spears       26 btittany spears     9 rbitney spears       4 brbritney spears  3 britterny spears    2 britannt spears
  1211 britnet spears       24 beitney spears      8 birtiny spears       4 breatiny spears   3 brittneey spears    2 britannu spears
  1096 britiney spears      24 birteny spears      8 bithney spears       4 breetney spears   3 brittnney spears    2 britanyt spears
   991 britaney spears      24 brightney spears    8 brattany spears      4 bretiney spears   3 brittnyey spears    2 briteeny spears
   991 britnay spears       24 brintiny spears     8 breitny spears       4 brfitney spears   3 brityen spears      2 britenany spears
   811 brithney spears      24 britanty spears     8 breteny spears       4 briattany spears  3 briytney spears     2 briteniy spears
   811 brtiney spears       24 britenny spears     8 brightny spears      4 brieteny spears   3 brltney spears      2 britenys spears
   664 birtney spears       24 britini spears      8 brintay spears       4 briety spears     3 broteny spears      2 britianey spears
   664 brittney spears      24 britnwy spears      8 brinttey spears      4 briitny spears    3 brtaney spears      2 britin spears
   664 briteney spears      24 britni spears       8 briotney spears      4 briittany spears  3 brtiiany spears     2 britinary spears
   601 bitney spears        24 brittnie spears     8 britanys spears      4 brinie spears     3 brtinay spears      2 britmy spears
   601 brinty spears        21 biritney spears     8 britley spears       4 brinteney spears  3 brtinney spears     2 britnaney spears
   544 brittaney spears     21 birtany spears      8 britneyb spears      4 brintne spears    3 brtitany spears     2 britnat spears
   544 brittnay spears      21 biteny spears       8 britnrey spears      4 britaby spears    3 brtiteny spears     2 britnbey spears
   364 britey spears        21 bratney spears      8 britnty spears       4 britaey spears    3 brtnet spears       2 britndy spears
   364 brittiny spears      21 britani spears      8 brittner spears      4 britainey spears  3 brytiny spears      2 britneh spears
   329 brtney spears        21 britanie spears     8 brottany spears      4 britinie spears   3 btney spears        2 britneney spears
   269 bretney spears       21 briteany spears     7 baritney spears      4 britinney spears  3 drittney spears     2 britney6 spears
   269 britneys spears      21 brittay spears      7 birntey spears       4 britmney spears   3 pretney spears      2 britneye spears
   244 britne spears        21 brittinay spears    7 biteney spears       4 britnear spears   3 rbritney spears     2 britneyh spears
   244 brytney spears       21 brtany spears       7 bitiny spears        4 britnel spears    2 barittany spears    2 britneym spears
   220 breatney spears      21 brtiany spears      7 breatney spears      4 britneuy spears   2 bbbritney spears    2 britneyyy spears
   220 britiany spears      19 birney spears       7 brianty spears       4 britnewy spears   2 bbitney spears      2 britnhey spears
   199 britnney spears      19 brirtney spears     7 brintye spears       4 britnmey spears   2 bbrity spears
   163 britnry spears       19 britnaey spears     7 britianny spears     4 brittaby spears
```

The End